



# AUTOMATIC ELECTRIC BILL GENERATION

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**Abstract:** Manual meter reading systems using electromechanical meters are installed within the premises of residential or commercial consumers and information about the units of consumption of electricity are collected on a monthly basis. However, this present convention has the following disadvantages: Manpower must be hired to go from household to read energy consumption, record data and communicate with a receiving module. Use of manual meters could turn to meter reading mistakes and errors of leakage. Our project aims the recreation of this energy metering system in MATLAB and observes the changes in consumption of energy units. This type of a system will not only help in reducing the manpower but also help the consumer to keep a track of the units consumed.

**Keywords:** Character recognition, Image processing, MATLAB

## I. INTRODUCTION

Electricity plays a major role in our lives. The use of electricity is escalating day by day. We use it everywhere and for different reasons that we cannot imagine our lives without it. As in some places now also where the technique of digital meter is not implemented, in those places electric meter reading technique is most usable. As the existing method of manual electric meter reading is not applicable with the increasing utilization of electricity and has a lot of drawbacks like time consumption, more human resources and is prone to lot of errors. The difference is in how to collect and process information that both traditional meter reading and electric meter reading follow.

Everyone must have faced problem with energy meter reading. After getting flawed bill, it is problem of user to get it corrected from the MSEB. Person has to visit the office, get in line and get it corrected. The problem is just because of human involvement. At present, person from EB [electricity board], comes and will take a snap of energy meter. After data base collection, next step is to download all the images, and SCAN all the photographs to find out consumer number and Meter reading. While doing this there is huge possibility of causing a manual error, which eventually creates problem for normal consumer. To steer clear of human intervention in the billing process, now new generation, energy meter will be set with camera module with wireless transmission. Database is made to store information. In our country consumers are not content with the services of power distribution companies like MSEDCL; because of conventional meter billing methods adopted which call for huge number of labor and stretched working hours to collect complete data and billing. Human operator billing method is prone to flawed. At times, the energy meter is placed in a location where it is not easily accessible. Manual billing is sometimes constrained and slowed down by various reasons. Printed billing has the tendency to lose in the mail box. With the continuously increasing population and industrialization in the countries like India, to facilitate easy and trusted service with minimum operating cost, a better technique of billing procedure is proposed in this project.

The software platform to be used is MATLAB. MATLAB is an influential software tool used to execute the tasks that entail extensive computation. It provides easy and rapid implementation of algorithms compared to C and C++. The crucial feature in MATLAB is that it includes rich library functions for image processing and data analysis.

MATLAB offers a simple approach for debugging and correction of errors in any algorithm. Taking the above advantages into account, this project is being implemented with an algorithm for Automatic Electricity Billing using MATLAB. The algorithm makes use of a variety of inbuilt functions and implements few users defined routines related to image processing.

## II. PROPOSED METHOD

### A. Image Binarization

Binary image is a digital image that contain only 2 values for each pixel. The 2 colors utilized in a binary image are black and white. The grayscale image is then changed into black and white image by using binarization. The pixels below a certain threshold value are assigned 0 (i.e., black) and pixels above the threshold is assigned 1 (i.e., white).

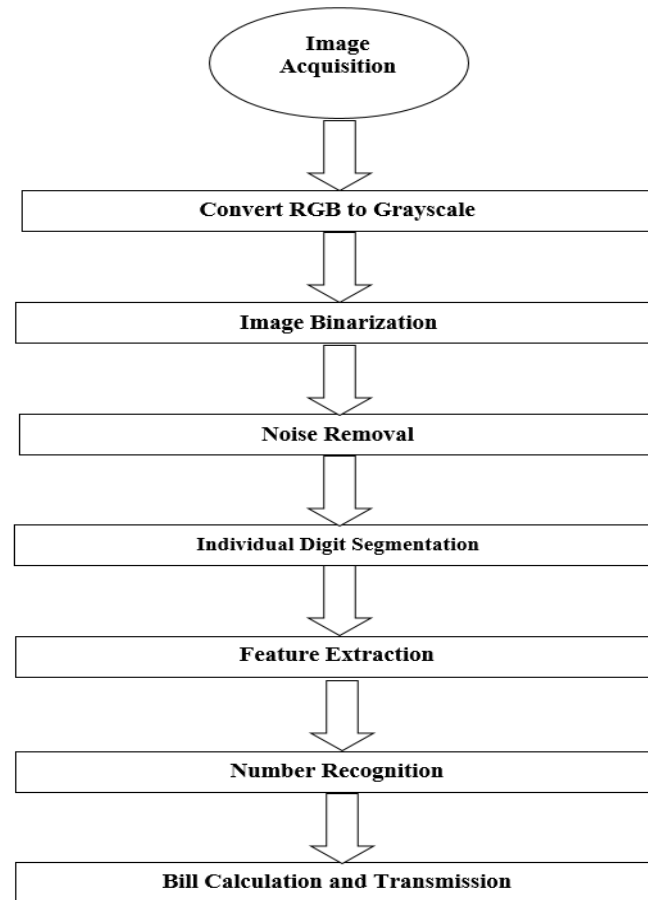


Fig.1: System Overview

**B. Noise Removal**

Image analysis can be simplified if this noise can be eliminated or can be filtered out. Noise is added in the image at the time of image acquisition or transmission. Since, the noise could appear on the image after the binarization, noise reduction algorithm must be applied to reduce the noise.

**C. Individual Digit Segmentation**

Image segmentation is the method of dividing a digital image into multiple segments. Image segmentation is the method of assigning a specific label to every pixel in an image such that picture locations with the same label have certain common features.

**D. Feature Extraction**

In this process we take a digit sample and extract its features to form a vector of  $108 \times 1$ . The sample image is divided into 9 regions. Each region has been extracted with 12 features thereby 108 features are extracted of a single sample.

**E. Number Recognition**

The segmented images are compared to the number templates. The correlation of each segmented image is compared to the template images one by one. The number that represents template with the maximum correlation for a segmented image is selected and thus the number is recognized.

**III. BILL CALCULATION AND TRANSMISSION**

After the image processing, a segmented character is achieved which is then recognized. This gives the current month reading. The previous month readings are stored in a database. The difference between the current month reading and previous month reading is taken and this difference gives the amount of energy consumed for that particular month. This amount is then multiplied by the tariff as specified by the electricity board and the bill is calculated.



## IV.RESULT

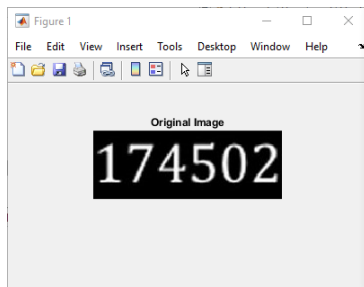
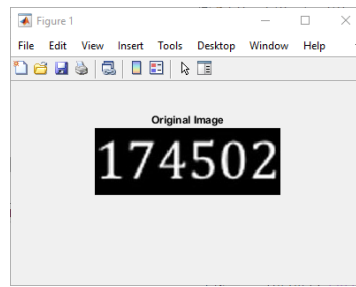
Fig.2: Original Image Reading  
(Previous Month)

Fig.3: Grayscale Image

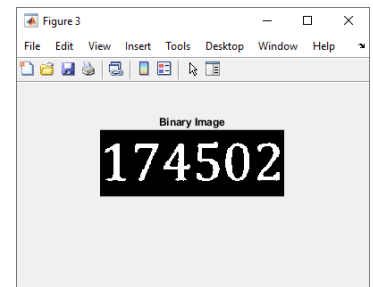


Fig.4: Binary Image

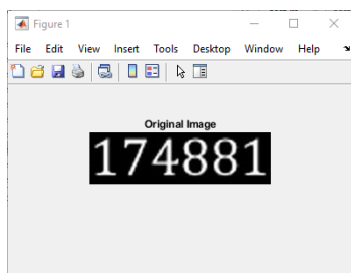
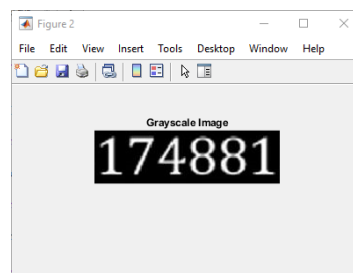
Fig.5: Original Image Reading  
(Previous Month)

Fig.6: Grayscale Image

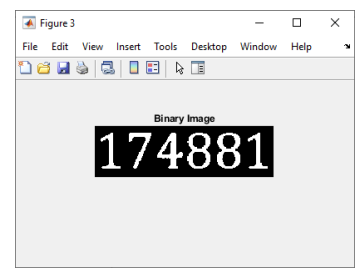


Fig.7: Binary Image

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Comments window
Current Month Reading : 174502

Current Month Reading : 174881

Number of units consumed :    379

Final Bill Amount :          2490

379
786
985
455
331
866
102
344
347
281
123
168

Average Units Burnt in 1 year : 430.5833

fx >>

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Fig.8: Output Screen

## V.CONCLUSION

The proposed work eliminates the need of manpower for the electricity billing system. Not only does it eliminate the need of manpower but it serves to be a more accurate method as there is no human intervention. It also requires no paper for billing purpose.

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